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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/007,890	11/09/2001	David W. Wang	60617.300801	3655

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CONNELLY CUSHWA, MICHELLE R

ART UNIT	PAPER NUMBER
2874	

DATE MAILED: 03/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/007,890	WANG ET AL.	<i>M</i>
	Examiner	Art Unit	
	Michelle R. Connelly-Cushwa	2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on ____ .

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-29 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5) Claim(s) ____ is/are allowed.

6) Claim(s) 1-19 and 23-29 is/are rejected.

7) Claim(s) 20-22 is/are objected to.

8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 09 November 2001 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on ____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.

2. Certified copies of the priority documents have been received in Application No. ____ .

3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.

4) Interview Summary (PTO-413) Paper No(s). ____ .

5) Notice of Informal Patent Application (PTO-152)

6) Other: _____

DETAILED ACTION

Information Disclosure Statement

The prior art documents submitted by applicant in the Information Disclosure Statement filed on January 25, 2002 have all been considered and made of record (note the attached copy of form PTO-1449).

Drawings

Nineteen (19) sheets of formal drawings were filed on November 9, 2001 and have been accepted by the Examiner.

Specification

Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 9 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 9; the claim recites the limitation "said light beam" in line 5 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Regarding claim 10; the claim inherently contains the deficiencies of any base or intervening claim from which it depends.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 9, 14, 17, 18, 23 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Nichols et al. (EP 1 028 504 A1).

Regarding claims 1, 2, 9, 14, 17, 18, 23 and 24; Figure 1 of Nichols et al. discloses an optical grating (20) comprising:

- a background region of a first material (16) having a first refractive index; and
- a grid of cells within the background region (16);
- wherein the cells are of a second material having a second refractive index;
- wherein the grid is two-dimensional, thereby making the optical grating a planar grating;
- wherein the cells have a first set of surface-to-surface separations and a first set of cell-to-cell separations such that the constructive interference will occur for a first light wavelength when it is present in a light beam; and

- wherein the grid of cells has at least one set of surface-to-surface separations and cell-to-cell separations based on Bragg's law for a specific light wavelength.

Claims 1-14, 17, 18 and 23-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Grann et al. (US 6,212,312 B1).

Regarding claims 1, 2, 17, 18 and 23; In Figure 1, Grann et al. discloses an optical grating comprising:

- a background region (11) of a first material having a first refractive index (n2); and
- a grid of cells (12) within the background region;
- wherein the cells (12) are of a second material (13) having a second refractive index (n1); and
- wherein the grid is two-dimensional, thereby making the optical grating a planar grating.

Regarding claims 3-14 and 24-29; Figure 3 of Grann et al. discloses an optical grating (20), comprising:

- an array of the optical gratings disclosed in Figure 1;
- wherein the grid formed by the array of optical gratings of Figure 1 is three-dimensional, thereby making a cubical grating;
- wherein the plurality of cells each have at least one incident surface pitched such that, when the optical grating receives a light beam, first portions thereof

may strike the incident surfaces and be reflected therefrom as reflected beams;

- wherein the plurality of cells each have a first set of surface-to-surface and a first set of cell-to-cell separations such that the reflected beams will constructively interfere for a first pre-determined light wavelength ($\lambda 1$) when it is present in the light beam;
- wherein the cells further have a second set of surface-to-surface separations and a second set of cell-to-cell separations such that constructive interference will occur for a second light wavelength ($\lambda 2$) when it is present in the light beam;
- wherein the cells further have a third set of surface-to-surface separations and a third set of cell-to-cell separations such that constructive interference will occur for a third light wavelength ($\lambda 3$) when it is present in the light beam;
- wherein the plurality of cells also each have opposed surfaces, respective to the incident surfaces, and the incident surfaces are additionally pitched such that, when the optical grating receives the light beam, second portions thereof may enter the cell, travel to the opposed surfaces, be reflected therefrom, travel back to the incident surfaces and exit the cell as refracted beams;
- wherein at least one of the incident surfaces and respective opposed surfaces have surface-to-surface optical separations such that the reflected beam and the refracted beam will constructively interfere for a light wavelength when it is present in the light beam;

- wherein the plurality of cells each have cell-to-cell separations such that the reflected beams will also constructively interfere for the light wavelength; and
- wherein the grid of cells have at least one set of surface-to-surface separations and cell-to-cell separations based on Bragg's law for a specific light wavelength.

Claims 1-15, 17, 18 and 23-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsuda (US 6,404,947 B1).

Regarding claims 1-15, 17, 18 and 23-29; In Figure 3 and in column 9, line 48, through column 10, line 25, Matsuda discloses an optical grating (21), comprising:

- a number of lattice layers, each lattice layer having:
 - o a background region of a first material having a first refractive index; and
 - o a grid of cells within the background region;
 - o wherein the grid of cells are of a second material having a second refractive index;
- wherein the grid of cells in each lattice layer is a two-dimensional array, thereby making each lattice layer a planar optical grating;
- wherein the multiple grids (i.e. lattice layers) together are three-dimensional, thereby making a cubical grating;
- wherein the plurality of cells each have at least one incident surface pitched such that, when the optical grating receives a light beam, first portions thereof

may strike the incident surfaces and be reflected there from as reflected beams;

- wherein the plurality of cells have first, second and third surface-surface separations and first, second and third cell-to-cell separations such that the reflected beams will constructively interfere for pre-determined first, second and third light wavelengths when they are present in the light beam (see column 10, line 15, through column 11, line 11);
- wherein the plurality of cells each have opposed surfaces, respective to the incident surfaces and the incident surfaces are additionally pitched such that, when the optical grating receives the light beam, second portions thereof may enter the cell, travel to the opposed surfaces, be reflected therefrom, travel back to the incident surfaces, and exit the cell as refracted beams;
- wherein the incident and opposed surfaces have surface-to-surface separations and cell-to-cell separations such that the reflected beam and the refracted beam constructively interfere for a light wavelength when it is present in the light beam;
- wherein the grid of cells have at least one set of surface-to-surface separations and cell-to-cell separations based on Bragg's law for a specific light wavelength; and
- wherein the first and second materials may be Si or GaAs.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 15, 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Grann et al. (US 6,212,312 B1).

Regarding claims 15, 16 and 19; Grann et al. discloses all of the limitations of claim 15, except for the first and second materials being a specific material. One of ordinary skill in the art would have found it an obvious design choice to form the first and second materials from any well known materials, including Si, GaAs, SiO₂, etc., since such materials are well known and commonly used in the art and Grann et al. does not disclose that any specific materials are to be used.

Additionally, materials such as silicon are commonly used in both doped and undoped states in the art to form optical gratings. Therefore, one of ordinary skill in the art would have found it an obvious design choice to form the first and second materials from a base material, such as silicon, wherein one of the materials is altered by doping the silicon, since Grann et al. does not disclose that any specific materials are to be used and both doped and un-doped silicon and other materials are well known and commonly used in the art to form optical gratings.

Allowable Subject Matter

Claims 20-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art cited on attached form PTO-892 is the most relevant prior art known, however, the invention of claims 20-22 distinguishes over the prior art of record for the following reasons.

Regarding claims 20 and 21; the claims are allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious a method as defined in claim 20, wherein the step (a) includes doping with the impurity such that the first refractive index has a gradient. Claim 21 depends from claim 20.

Regarding claim 22; the claim is allowable over the prior art of record because none of the references either alone or in combination disclose or render obvious a method as defined in claim 22, wherein the step (b) includes providing the cells with the second material such that the second refractive index varies along a gradient.

Hence, there is no reason or motivation for one of ordinary skill in the art to use the prior art of record to make the invention of claims 20-22.

Conclusion

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Any inquiry concerning the merits of this communication should be directed to Examiner Michelle R. Connelly-Cushwa at telephone number (703) 305-5327. Any inquiry of a general or clerical nature (i.e. a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at telephone number (703) 308-0956 or to the technical support staff supervisor at telephone number (703) 308-3072.



Akim E. Ulah
Primary Examiner

Michelle R. Connelly-Cushwa

MRCC

March 12, 2003